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THE WORK OF THE SCOTTSBLUFF RECLAMATION PROJECT EXPERIMENT FARM IN 1917

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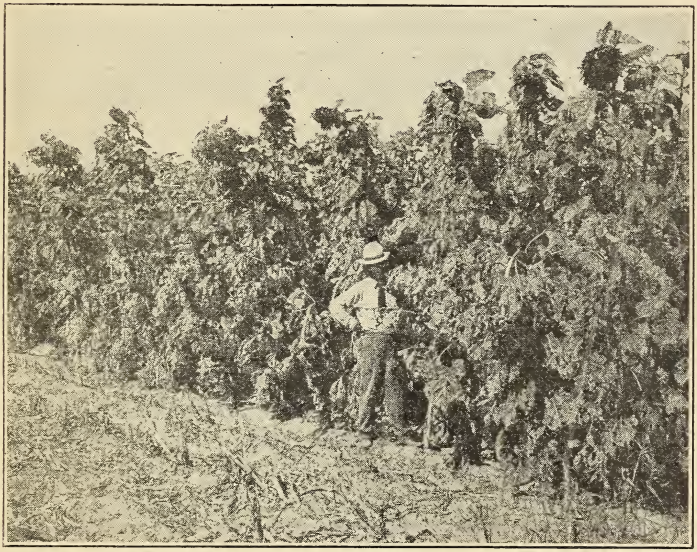

Russian Sunflowers Grown for Silage on the Scottsbluff Experiment Farm

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THE SCOTTSBLUFF EXPERIMENT FARM is located on the North Platte Reclamation Project, 6 miles east of Mitchell and about 8 miles northwest of Scottsbluff, Nebr. The farm includes 160 acres of land, and the work is supported cooperatively by the United States Department of Agriculture and the Nebraska Agricultural Experiment Station. Operations on this farm were begun in 1909.

In 1917 the Federal Government deeded to the University of Nebraska 800 acres of land located 5 miles north of the experiment farm, to be made a part of it, for the purpose of conducting grazing experiments.

Mr. David W. Jones, jr., assistant, had direct supervision of the work of crop rotation under irrigation and assisted in the preparation of this report.

The dry-land work is conducted by the Office of Dry-Land Agriculture, Bureau of Plant Industry, and during the past season was under the direct supervision of Mr. Albert Osenbrug.

The live-stock work is in cooperation with the Animal Husbandry Division of the Bureau of Animal Industry and during the past year was under the direct supervision of Mr. George Neuswanger.

THE WORK OF THE SCOTTSBLUFF RECLAMATION PROJECT EXPERIMENT FARM IN 1917.

CONTENTS.

PROGRESS OF THE EXPERIMENTAL WORK.

This report is intended to show the progress of the experimental work on the Scottsbluff Experiment Farm, with a brief survey of the agricultural situation on the North Platte Reclamation Project.

The work of the Scottsbluff Experiment Farm is conducted cooperatively by the United States Department of Agriculture and the Nebraska Agricultural Experiment Station and is divided into four general lines, as follows:

(1) General irrigated-crop experiments.
(2) Rotation of crops under irrigation.
(3) Rotation and cultural operations with crops under dry-land conditions.
(4) Live-stock work.

It has been the aim to conduct such experimental work as will furnish information concerning local agricultural problems as well as to deal with the more general problems of crop production and crop utilization. Following is a brief outline of the work conducted at the experiment farm during 1917: (1) Variety tests of the more important crops grown on the project, (2) cultural tests, (3) time-of-planting tests, (4) irrigation tests, (5) tests in crop rotation under irrigation, (6) grass-pasture establishment, (7) pasturing tests with hogs, (8) crop rotation and cultural operations under dry-land conditions, (9) dry-lot feeding test with hogs, (10) sheep feeding tests, and (11) dairy work. Only the first seven of these are dealt with in detail in this report.

The arrangement of the fields and the location of the experiments in 1917 are shown in figure 1.

NORTH PLATTE RECLAMATION PROJECT.

The North Platte Reclamation Project includes land in both eastern Wyoming and western Nebraska. At the present time water is available for 111,114 acres of land, 83,203 of which were cropped and irrigated during the summer of 1917. All this land is irrigated from the north side canal. There is now under construction a south side canal, which will reclaim about 100,000 acres more lying on the south

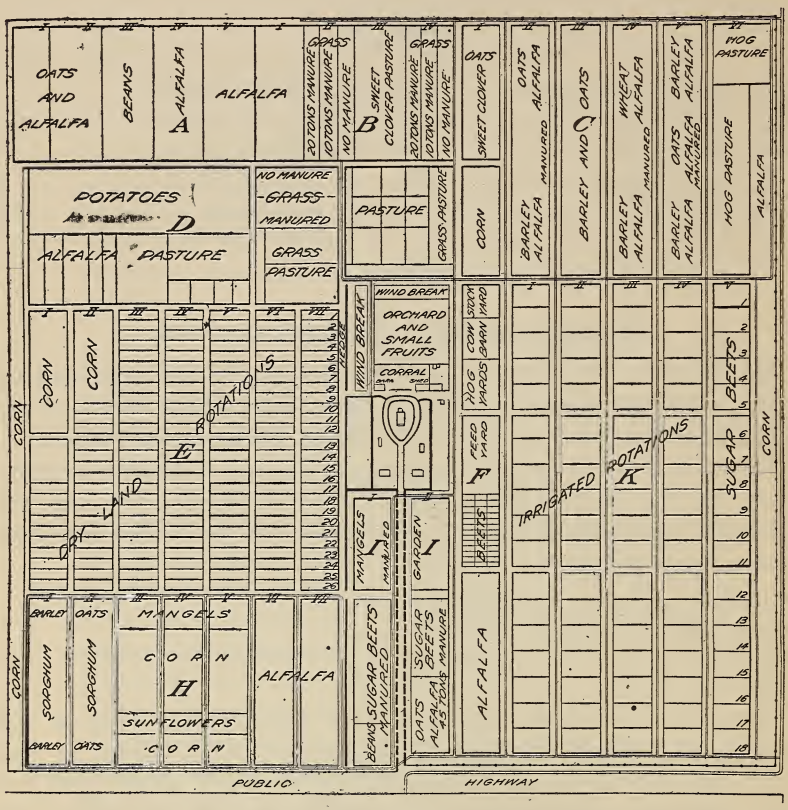

FIG. 1.—Diagram of the Scottsbluff Experiment Farm, showing the arrangement of the fields and the location of the experiments in 1917.

side of the North Platte River. A part of this land on the south side was furnished with water during the crop season of 1918.

In addition to this, the United States Reclamation Service furnishes water to a number of privately owned ditches along the North Platte River. These canals and ditches are supplied with water from the Pathfinder reservoir, the dam of which is at a point 3 miles below the junction of the North Platte and Sweetwater Rivers, 50 miles southwest of Casper, Wyo. The flood waters are stored in this

reservoir during the early spring, to be released during the summer when needed for irrigation. The old river bed acts as a carrier from the Pathfinder reservoir to the Whalen diversion dam, a distance of 150 miles. At the Whalen dam the water is diverted into the two main canals of the North Platte project. The one on the north side is completed, while the one on the south side is under construction.

The main north side canal is 94.6 miles long. From this canal the water is delivered to each farm unit through a system of laterals. Near the lower end of the main canal are two reservoirs which are supplied with water from the main canal during the late fall and early spring. This water is then used to supplement the supply during the following irrigation season.

The soil of the North Platte project is a light sandy loam. Being in a locality subject to heavy spring winds, some damage is done each spring to young crops, particularly to sugar beets. The land is productive, especially after it has once been in alfalfa or when manured. It is very easily worked, but requires more frequent irrigation than a heavier soil would

CONDITIONS ON THE PROJECT.

CLIMATIC.

The winter of 1916–17 was unusually long and cold. It was the most severe winter on live stock that has been experienced for many years. As the feeding period was much longer than normal, hay became very scarce and sold for a high price. As a result cattle were rushed back to the range on the first indication of spring. This first warm spell was followed by severe wet weather, and as a consequence a very large number of cattle perished from exposure and lack of feed. The shortage of hay also worked a hardship on many farmers who had to buy hay to carry them through the spring work.

The weather was abnormal both in the spring and in the fall. The spring was very wet and backward, while the fall was very mild and free from storms until the end of the year. During most of the month of April and the first half of May the weather conditions were such that considerable field work was possible. Beginning about the middle of May, however, field work was stopped by storms which lasted until after the first of June. Most crops were planted from 10 days to 3 weeks later than usual. The total precipitation for the year was 13.74 inches, 9.32 inches of which fell during the months of April and May and the first four days of June. This wet season was followed by extremely dry weather. Only 2.39 inches of rain fell from June 5 to September 15. The total evaporation from April 1 to September 30 was 38.62 inches, and 18.22 inches of

this was during June and July. The last frost in the spring was on May 21, with a minimum temperature of 32° F., and the first frost in the fall was on October 7, with a minimum temperature of 28°, making a total frost-free period of 136 days. There were, however, 148 days between the last killing frost in the spring and the first killing frost in the fall. The maximum temperature for the year was 101° F. and the minimum −18°. The temperature of 101° is the highest ever recorded at the experiment farm. A summarized statement of the climatological data is given in Table I.

TABLE I.—*Summary of climatological observations at the Scottsbluff Experiment Farm, 1911 to 1917, inclusive.*

PRECIPITATION (INCHES).

Year, etc.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1911	0.45	0.10	0	2.31	0.81	2.13	1.28	0.65	2.14	1.10	0.08	0.34	11.39
1912	.20	.60	.27	3.72	1.65	1.61	2.45	2.77	2.70	1.16	.37	0	18.51
1913	0	0	0	.13	3.70	1.71	1.30	4.33	1.18	.47	.11	.80	13.73
1914	0	.04	0	3.18	2.29	1.84	.39	.54	.24	.88	0	.36	9.76
1915	.15	.71	2.12	4.27	2.37	1.94	2.20	4.62	3.65	.90	.05	.60	23.58
1916	.19	.16	.09	.53	2.21	2.14	1.87	2.24	.48	1.00	.19	.27	11.37
1917	.14	.06	.98	2.03	5.20	2.09	.62	.37	1.65	.37	.09	.14	13.74
Average	.16	.24	.49	2.31	2.60	1.92	1.44	2.21	1.73	.84	.12	.36	14.58

EVAPORATION (INCHES).

1911	.....	.....	.....	5.54	7.15	8.90	9.08	7.43	6.18	.....	.....	.....	44.28
1912	.....	.....	.....	4.24	7.14	6.64	6.67	6.32	4.16	.....	.....	.....	35.17
1913	.....	.....	.....	5.76	6.32	6.80	6.93	6.64	4.69	.....	.....	.....	37.14
1914	.....	.....	.....	4.60	6.42	7.17	8.42	7.91	5.77	.....	.....	.....	40.40
1915	.....	.....	.....	4.85	5.27	6.14	6.75	5.73	4.74	.....	.....	.....	33.48
1916	.....	.....	.....	4.86	6.72	7.13	8.91	6.70	5.96	.....	.....	.....	40.28
1917	.....	.....	.....	3.97	4.11	9.20	9.02	6.87	5.46	.....	.....	.....	38.63
Average	.....	.....	.....	4.83	6.16	7.42	7.97	6.80	5.28	.....	.....	.....	38.48

DAILY WIND VELOCITY (MILES PER HOUR).

Mean:												
1911	6.1	6.4	7.8	8.4	8.8	6.0	5.2	5.4	5.4	5.9	6.8	4.9
1912	5.4	5.7	6.7	8.6	8.1	5.4	4.0	4.2	5.0	5.0	4.3	6.4
1913	7.0	4.7	5.8	7.2	7.7	6.1	4.1	3.3	3.8	5.1	3.6	4.5
1914	5.6	5.6	7.3	7.4	6.2	5.2	4.3	4.7	4.8	4.0	3.7	5.1
1915	5.3	5.1	5.4	6.4	6.1	6.5	4.4	3.1	4.0	3.9	5.6	4.2
1916	6.6	5.0	7.1	5.8	7.0	5.6	4.0	2.9	3.5	4.1	4.6	5.5
1917	6.2	6.7	6.6	6.9	5.8	6.6	3.9	3.7	4.3	9.4	7.1	8.1
Maximum:												
1911	15.9	13.7	15.8	14.6	15.2	10.8	8.4	9.2	11.1	12.2	15.6	8.4
1912	12.4	14.7	15.3	31.4	16.6	15.9	6.0	7.0	11.5	10.8	12.6	15.8
1913	22.9	8.3	15.7	18.3	14.9	16.7	9.1	6.9	8.0	15.9	8.2	11.7
1914	10.8	13.8	13.7	13.3	13.8	12.1	6.7	9.2	8.3	11.2	10.0	16.7
1915	12.7	19.9	13.9	16.0	16.4	13.3	7.8	6.0	8.3	8.8	13.1	8.2
1916	28.6	8.4	18.0	11.9	13.3	10.8	7.2	5.8	7.1	7.6	10.9	12.9
1917	12.3	14.0	16.4	11.6	13.9	11.9	5.6	5.9	6.8	23.1	11.9	14.9
Minimum:												
1911	1.7	2.1	3.0	3.6	4.8	3.0	3.1	2.6	2.9	2.5	1.9	1.2
1912	1.6	1.4	2.7	3.2	2.9	1.6	2.0	2.6	2.4	2.0	1.1	1.3
1913	1.9	1.0	1.5	2.5	3.7	.1	.4	.2	.1	.8	1.1	.8
1914	2.1	1.3	1.9	2.9	2.9	2.1	1.3	2.5	1.7	1.9	.5	.3
1915	.8	.4	.5	2.4	.1	2.7	1.7	.9	.9	1.5	1.3	1.3
1916	1.9	2.2	2.5	2.1	3.5	2.9	1.9	1.3	1.5	2.1	.9	1.7
1917	2.0	1.4	1.9	2.9	1.0	2.0	2.4	1.4	2.3	4.0	2.3	1.8

TABLE I.—*Summary of climatological observations at the Scottsbluff Experiment Farm, 1911 to 1917, inclusive*—Continued.

MONTHLY TEMPERATURE (° F.).

Year, etc.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Mean:													
1911	29	27	42	45	46	70	69	68	64	43	32	24	.....
1912	20	24	21	45	55	63	69	67	52	47	39	27	.....
1913	22	15	31	46	57	64	69	72	56	56	39	14	.....
1914	31	22	37	45	57	66	74	69	62	43	40	21	.....
1915	22	30	27	52	51	60	67	66	58	30	38	31	.....
1916	17	30	43	45	55	63	75	68	59	45	31	20	.....
1917	21	28	29	42	50	63	74	67	61	45	43	30	.....
Maximum:													
1911	68	64	74	80	88	95	94	98	93	78	66	62	.....
1912	53	50	55	73	87	93	91	96	89	83	71	56	.....
1913	[a] 58	61	67	84	90	95	97	97	90	83	73	36	.....
1914	50	62	66	77	87	95	98	98	92	81	75	50	.....
1915	63	67	63	79	89	82	93	91	92	83	72	63	.....
1916	63	66	78	82	92	99	98	92	94	80	74	60	.....
1917	54	66	76	80	88	97	101	96	94	81	75	90	.....
Minimum:													
1911	−19	− 7	11	11	22	42	40	41	38	11	−12	−11	.....
1912	−21	−14	−15	25	30	39	47	44	22	12	3	1	.....
1913	−28	−18	−11	16	26	41	37	50	24	12	13	− 9	.....
1914	8	−23	7	10	31	42	51	45	30	20	3	−15	.....
1915	−23	− 4	− 8	28	23	32	41	44	36	21	6	− 5	.....
1916	−22	−15	− 9	19	24	35	50	42	29	17	−21	−17	.....
1917	−18	−13	− 2	17	26	33	46	40	34	1	17	−14	.....

KILLING FROSTS.

Year.	Last in spring.		First in autumn.		Length of frost-free period.
	Date.	Minimum temperature.	Date.	Minimum temperature.	
		° F.		° F.	
1911	May 26	28	Oct. 3	31	129
1912	May 13	30	Sept. 16	31	124
1913	May 2	26	Sept. 19	31	124
1914	May 7	32	Sept. 13	30	129
1915	June 12	32	Oct. 3	32	113
1916	May 2	24	Sept. 14	30	133
1917	May 21	32	Oct. 7	28	136

[a] 11 days.

CROP CONDITIONS.

Despite the adverse seasonal conditions the 1917 crop yields were good. On an average, they were perhaps above normal, with the potato yield unusually high and the alfalfa yield a little low. Prices, however, were very much above normal, so that the money value of the crop produced was more than double that of any previous year. The principal crops grown on the project, in the order of their total money value, were alfalfa, potatoes, sugar beets, corn, and oats. The total value of the three small grains—oats, barley, and wheat—was less than half the value of the sugar-beet crop. A summary of the 1917 crop yields is given in Table II.

TABLE II.—*Acreage, yields, and farm values of crops grown on the North Platte Reclamation Project in 1917.*

Crop.	Area (acres).	Yields.				Farm values.		
		Unit of yield.	Total.	Per acre.		Per unit of yield.	Total.	Average per acre.
				Average.	Maximum.			
Alfalfa hay	34,374	Ton	58,656	1.7	3.5	$17.00	$997,152.00	$29.00
Alfalfa seed	40	Bushel	51	1.3	1.6	10.00	510.00	12.75
Beans	2,304	do	14,224	6.2	22.0	6.00	85,344.00	37.04
Sugar beets	9,357	Ton	99,790	10.7	18.0	7.50	748,425.00	79.99
Potatoes	4,833	Bushel	1,119,626	231.7	700.0	.80	895,700.80	185.33
Oats	10,173	do	243,764	24.0	77.0	.70	170,634.80	16.77
Wheat	3,128	do	47,467	15.2	58.0	1.80	85,440.60	27.31
Corn	6,051	do	117,008	19.3	75.0	1.50	175,512.00	29.01
Rye	471	do	3,434	7.3	17.5	1.50	5,151.00	10.94
Barley	3,052	do	94,868	31.0	69.0	1.20	113,841.60	37.30
Miscellaneous	6,977						107,347.25	15.38
Alfalfa seeded	8,280							
Total	83,203						3,385.059.05	
Average								41.92

In the early history of most irrigated sections, grain farming predominates. This is usually a period of very low profits. Alfalfa, however, soon replaces a large proportion of the small-grain acreage. Along with alfalfa comes more extensive planting of intertilled crops and an increase in the number of live stock, with consequent higher profits to the farmer.

The agriculture of the North Platte project, as will be seen in Table III, has passed through the grain-growing stage and now seems to be entering a period of diversification and developing a fairly definite system as regards both field crops and live stock. It is not quite so true of the individual farm as it is of the project as a whole. It can now be stated in advance with a fair degree of accuracy what portion of the total cropped area will be devoted to any certain field crop and also as to the number of the different live stock that will be produced or fed. An average of the past three years shows that 87 per cent of the total cropped area was devoted to alfalfa, sugar beets, potatoes, corn, and small grains. The principal lines of live stock are hog raising and sheep and cattle feeding, with indications of an increased tendency toward small dairy herds.

It is not to be understood by this that abnormal conditions do not cause fluctuations. The area devoted to potatoes from 1912 to 1916, inclusive, was 2 per cent of the total cropped area each year, while in 1917 it suddenly jumped to 6 per cent of that area. This increase was stimulated by the high price at which potatoes sold during the early part of 1917. A summary of the production, yields, and values of the principal crops grown on the project each year since 1910 is shown in Table III. The data for this table have been supplied by the United States Reclamation Service.

TABLE III.—*Statistical summary of acreage, yields, and farm values of the principal crops grown on the North Platte Reclamation Project during the 8-year period from 1910 to 1917, inclusive.*

Item and year.	All crops.	Alfalfa.	Beets.	Potatoes.	Corn.	Barley.	Oats.	Wheat.
Acreage:								
1910	42,362	3,707	283	3,854	5,207	1,138	11,419	9,597
1911	44,736	8,880	343	3,190	4,563	902	12,271	6,715
1912	50,250	19,512	667	1,192	6,260	1,156	10,093	4,390
1913	56,829	27,298	2,920	1,156	3,561	2,331	8,590	2,182
1914	60,532	32,464	5,083	1,097	6,024	2,261	7,017	609
1915	70,007	31,788	7,872	1,395	10,343	2,329	7,112	1,878
1916	75,620	32,601	9,024	1,735	6,715	4,857	10,375	2,617
1917	83,203	34,374	9,357	4,833	6,051	3,052	10,173	3,128
Production:		*Tons.*	*Tons.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
1910		7,763	1,126	139,440	15,806	8,545	151,773	85,127
1911		18,883	2,439	44,316	62,454	12,935	183,287	82,376
1912		42,604	7,132	121,392	96,821	31,064	295,360	75,354
1913		61,728	32,739	151,304	67,001	49,522	211,599	32,489
1914		71,405	53,282	159,027	93,186	53,022	146,211	9,979
1915		62,491	97,753	251,833	209,626	87,037	198,692	33,785
1916		59,706	92,104	274,100	125,911	106,096	191,204	28,207
1917		58,656	99,790	1,119,626	117,008	94,868	243,764	47,467
Average yield per acre:								
1910		2.0	4.0	39.0	3.0	8	13	9.0
1911		2.1	7.0	14.0	14.0	14	15	12.0
1912		2.2	11.0	102.0	15.0	27	29	17.0
1913		2.3	11.0	131.0	19.0	21	25	15.0
1914		2.2	10.5	145.0	15.0	23	21	16.0
1915		2.0	12.5	181.0	20.0	37	28	18.0
1916		1.8	10.2	158.0	19.0	22	18	11.0
1917		1.7	10.7	231.7	19.3	31	24	15.2
FARM VALUE.								
Per unit of yield:								
1910		$7.00	$5.00	$0.50	$0.35	$0.35	$0.40	$0.70
1911		6.00	5.00	.75	.60	.60	.50	.75
1912		5.00	5.60	.25	.40	.50	.35	.67
1913		5.00	5.50	.45	.70	.60	.40	.63
1914		4.50	5.50	.35	.75	.60	.40	.85
1915		5.00	5.50	.40	.50	.45	.40	.90
1916		7.50	6.25	.90	.70	.60	.50	1.20
1917		17.00	7.50	.80	1.50	1.20	.70	1.80
Per acre:								
1910	$6.47	14.66	19.90	18.09	1.06	2.62	5.32	6.21
1911	8.67	12.76	35.55	10.42	8.21	8.60	7.47	9.20
1912	11.04	10.92	59.88	25.46	6.19	13.44	10.24	11.50
1913	14.40	11.31	61.67	58.90	13.17	12.75	9.85	9.38
1914	14.95	9.90	57.65	50.74	11.60	14.07	8.33	13.93
1915	18.55	9.83	68.30	72.21	10.13	16.82	11.18	16.19
1916	21.85	13.74	63.79	142.18	13.13	13.10	9.21	12.93
1917	41.92	29.00	79.99	185.33	29.01	37.30	16.77	27.31
Total:								
1910	274,217.00	54,341.00	5,630.00	69,720.00	5,532.10	2,990.75	60,709.20	59,588.90
1911	388,225.50	113,298.00	12,195.00	33,237.00	37,472.40	7,761.00	91,643.50	61,782.00
1912	521,455.59	213,020.00	39,939.20	30,348.00	38,728.40	15,532.00	103,376.00	50,487.18
1913	786,619.72	308,640.00	180,064.50	68,086.80	46,900.70	29,713.20	84,639.60	20,468.07
1914	890,202.30	321,322.50	293,051.00	55,659.45	69,889.50	31,813.20	58,484.40	8,482.15
1915	1,263,616.75	312,455.00	537,641.50	100,733.20	104,813.00	39,166.65	79,476.80	30,406.50
1916	1,633,389.80	447,795.00	575,650.00	246,690.00	88,137.70	63,657.60	95,602.00	33,848.40
1917	3,385,059.05	997,152.00	748,425.00	895,700.80	175,512.00	113,841.60	170,634.80	85,440.60

As shown in Table III under the heading "Average yield per acre," alfalfa is the only crop of which the yield has not increased with the development of the project. In most cases the yield of each crop has been more than doubled since the first year. Alfalfa has shown no such increase; in fact, the 1916 and 1917 yields were the lowest in the history of the project. This decrease in the alfalfa yield during the past two years is due in a large measure to grasshoppers and a shortage of irrigation water. During both these years water has

been scarce, and as a result alfalfa was left to suffer while the water was used on other crops. Had it not been for these disadvantages the yield no doubt would have been at least normal. But it is doubtful whether the land now will produce any more alfalfa, other things being equal, than it did during the first few years. Alfalfa does exceptionally well on the light soil of the project, regardless of whether it is on new land or old land. The main requirement seems to be an abundance of water. This does not appear to be the case with other crops. At the present time the average yields of potatoes, sugar beets, corn, and small grains are much higher than they were during the early period of the development of the project. This increase is perhaps due to many factors. Notwithstanding the fact that the yield of alfalfa has not increased, it is possible that the production of alfalfa has been the big factor in causing the increase in the other crops. Results from the experiment farm show that land that has been in alfalfa produces from 18 to 56 per cent higher yields than land that has not been in alfalfa. Up to and including 1917 more than 23,900 acres of alfalfa on the project had been plowed up. The residual effect of the alfalfa has without doubt stimulated the yields of the crops that followed.

The average farm prices of the principal crops for each year are given in Table III under the heading "Farm value, per unit of yield." As shown in this table the prices of all crops have fluctuated from year to year, with the 1917 prices at the highest point, with the exception of potatoes, which reached the highest point in 1916.

The average crop value per acre for the total cropped area and for each of the principal crops from 1912 to 1917, inclusive, are shown in Table III under the heading "Farm value, per acre." As shown in the first column of this table, the returns per acre in 1917 were almost twice as much as they were in 1916 and as much as the total for the first four years. The widest fluctuation in returns of any one crop was with potatoes, which varied from $10.42 per acre in 1911 to $185.33 per acre in 1917. Sugar beets show the least variation. The return per acre from oats is considerably lower than the other grain crops.

The total crop values for the project and for each of the main crops are given in Table III under the heading "Farm value, total." The crop value has increased from slightly more than a quarter of a million in 1910 to more than three and a quarter millions in 1917. Of the individual crops, alfalfa since 1910 has ranked first except in 1915 and 1916, when sugar beets took first place. In 1917 sugar beets were crowded to third place by potatoes. Potatoes, with only 6 per cent of the total cropped area in 1917, produced a crop value of $895,700.80, while alfalfa, with 41 per cent of the total cropped area, produced a value of $997,152. The crop value from potatoes was

two and a half times greater than that from small grain, which had an acreage three times as great, notwithstanding the fact that the price of grain was relatively higher than the price of potatoes.

LIVE STOCK.

The live-stock industries on the project show increases in some lines and decreases in others, as set forth in Table IV. The total increase of horses was 402, while the number of head of cattle increased 1,005 and 305 for the beef and dairy types, respectively. Sheep show a decrease. The big decrease is shown in the number of hogs, which have fallen off from 25,123 in 1916 to 16,550 in 1917. Fowls and bees also show a decrease. The number of horses kept on the project farms has increased a little more than proportionally to the increase in total cropped acreage. In 1911 there was one horse for each 16.2 acres of cropped land, while during the past three years there has been one horse for each 12 acres of cropped land.

There seems to be a growing tendency among farmers on the project to keep a few cattle to clean up the roughage on the farm. These cattle as a rule are taken to the range for the summer months and brought back to the farm in the fall. A rather large number of farmers seem to be shifting toward a 6-cow or 8-cow dairy. The most enthusiastic of these small dairymen, however, do not claim high profits, but rather that a small herd does not interfere materially with their general field operations, that the cream checks pay the grocery bills, and that the increase in the herd will pay the water operation and maintenance charges.

TABLE IV.—*Number of live stock on the North Platte Reclamation Project during the 7-year period from 1911 to 1917.*

Year.	On hand at the close of the year.							Brought on for feeding.		
	Horses.	Cattle.		Sheep.	Hogs.	Fowls.	Bees (hives).	Sheep.	Cattle.	Horses.
		Beef.	Dairy.							
1911	2,722	2,179		2,000	7,000	2,000	50	25,000	.....	.....
1912	3,329	1,866		2,000	9,123	3,000	80	55,000	.....	.....
1913	3,785	1,640	1,326	5,000	14,286	37,620	315	63,000	3,000	.....
1914	4,618	1,669	1,521	605	22,143	43,898	476	75,000	4,700	700
1915	5,910	4,723	2,218	2,254	24,928	46,971	630	83,000	3,000	500
1916	6,398	5,010	3,040	1,401	25,123	59,249	764	83,500	4,600	500
1917	6,800	6,035	3,345	1,000	16,550	56,015	517	80,000	5,400	500

The hog industry, which is the principal live-stock interest on the project, has shown a marked decrease during the past year. This decrease was probably due to the exceptionally high cost of feed. In many instances during the fall and winter of 1917–18 hogs were fed at a loss.

Table IV also shows the number of the different live stock that were brought to the project to be fed for market. As shown in this table,

there were fewer sheep fed in 1917 than in 1916, while there was a small increase in the number of cattle. Sheep feeding in 1915 and 1916 was very profitable, while the sheep feeders of 1917 in most cases lost money.

DISEASES AND PESTS.

Animal diseases.—Hog cholera was not so prevalent on the project in 1917 as it has been in the past. In 1916 there were 66 outbreaks, with a total loss of some 250 hogs, while in 1917 there were only 25 outbreaks, with a loss of about 100 hogs. These figures were obtained from the Office of Demonstrations on Reclamation Projects, which maintains on the project a man whose duty it is to look after the hog-cholera situation.

Blackleg among cattle is rather common on the project. Calves between the ages of 6 months and 2 years are most susceptible. Vaccination is a means of prevention. As vaccinating is very inexpensive it is to be recommended.

Insects.—The grasshopper damage on the project is becoming serious. Even in 1916 the pests were troublesome, but in 1917 they did a great amount of damage not only to alfalfa but to many other crops. The principal means of control are the destruction of the eggs and the grasshoppers. The eggs are best destroyed by disking from 2 to 3 inches deep, either in the late fall or early spring, all waste places, ditch banks, and alfalfa fields. The grasshoppers are best destroyed either by catching them in a hopperdozer or by poisoning them. A hopperdozer can be used to advantage on alfalfa fields, but if the insects become troublesome on other crops poison is perhaps the only means of control. The following poison bait is recommended by the University of Nebraska:[1]

Wheat bran	25 pounds.
Paris green or white arsenic	1 pound.
Molasses	2 quarts.
Water	4 gallons.
Juice of six lemons.	

The Paris green should be thoroughly mixed with the bran while dry. The bran is then thoroughly dampened with a mixture made of the water, molasses, and lemon juice. This bait is sown broadcast over the crop, along ditch banks, and in waste places. The results will be far more successful if the grasshoppers are combated while young.

CROP EXPERIMENTS.

During the year 1917 the experimental work progressed very satisfactorily, except that in a few instances the grasshoppers did some damage. Old experiments were brought forward another year

[1] Swenk, M. H. Grasshopper control. Nebr. Col. Agr., Extens. Serv., Emergency Bul. 17, 4 p., 1 fig. 1917.

and some new experiments were begun. The same general lines of work which have been described in previous reports were followed. It was the policy during the past year, however, to cut down on the number of varieties in the different variety tests and restrict the work to more established varieties from which seed stock of those showing marked superiority could be obtained.

ALFALFA.

VARIETY TEST.

In the spring of 1915 seven varieties or strains of alfalfa were seeded on duplicate tenth-acre plats in field F–I. As they were seeded in the spring without a nurse crop the weeds became very troublesome. The plats were clipped several times during the summer, but no yield of consequence was obtained. Early hail damaged the first cutting in 1916 and again in 1917. Three cuttings, however, were obtained during each of these two years. A statement of the yields from this variety test is given in Table V.

TABLE V.—*Yields of alfalfa in a variety test on the Scottsbluff Experiment Farm in 1916 and 1917.*

Variety.	Yield per acre (tons).			Above or below average.
	1916	1917	Total.	
Baltic	4.76	4.63	9.39	0.88
Grimm	4.58	4.59	9.07	.56
Kansas	4.50	4.41	8.92	.41
Black Hills	4.67	4.06	8.71	.20
Canadian	4.50	3.95	8.45	—.05
Turkestan	3.92	4.15	8.08	—.43
Native	3.49	3.44	6.93	—.58
Mean	4.35	4.19	8.51	.....

The yield given in the above table is, in each variety, the average of two plats. The Baltic is consistently high, while the Native is consistently low. The Baltic, Grimm, Kansas, and Black Hills are all above the average, while the Canadian, Turkestan, and Native are below it. All seemed to withstand the winters equally well.

CULTIVATION AND MANURING TEST.

In the fall of 1914 alfalfa was seeded in grain stubble on 12 tenth-acre plats in field A–IV. The hay was harvested from these plats during the summer of 1915. In the early spring of 1916 three plats were manured at the rate of 10 tons per acre, three plats were double disked, three were harrowed with a spring-tooth harrow, and three received no treatment. These same plats received the same treatment in the early spring of 1917. The yields from the last two cuttings in 1916 and from the three cuttings in 1917 are given in Table VI.

TABLE VI.—*Yields of alfalfa, showing the effect of cultivation and of manure on the crop on the Scottsbluff Experiment Farm in 1916 and 1917.*

Treatment.	Yield per acre (tons).		
	1916	1917	Total.
Harrowed (spring-tooth harrow)	2.72	4.33	7.05
Disked	2.53	4.53	7.06
Manured	2.76	4.61	7.37
No treatment	2.55	4.43	6.98

Table VI shows that the plats receiving no treatment gave the lowest total yield. Even if the difference here shown is entirely due to cultural treatment, the increase is very small compared with the cost of treatment. Surely the increase in yield from the manured plats does not warrant the application of manure. Manure can be used to far greater advantage for other crops.

COMPARISON OF SPRING SEEDING AND FALL SEEDING.

In the irrigated rotation experiments eight plats of alfalfa are seeded each year. Five plats are seeded in the spring on beet land and three plats are seeded in the fall in oat stubble. In most years the fall seeding has been completed before the end of August. In each case the alfalfa is seeded with a disk drill. The stubble is left standing as a winter protection for the young alfalfa. The yields from each of these seedings and from the alfalfa in fields 2 or 3 years old are given in Table VII.

TABLE VII.—*Spring seeding of alfalfa on beet land compared with fall seeding in oat stubble on the Scottsbluff Experiment Farm in 1917 and for a period of four years.*

Seeding.	Number of plats.	Yield per acre (tons).			
		Season of 1917.			4-year average.
		Maximum.	Minimum.	Mean.	
Spring seeded	5	0.53	0.27	0.42	1.55
Fall seeded	3	4.04	2.50	3.03	4.21
Old alfalfa (second and third years)	11	5.73	2.68	4.13	5.38

As shown in the above table, fall-seeded alfalfa produces a very good yield of hay the following season, whereas the spring-seeded alfalfa produces very little hay the first season. As the seeding expenses are about equal for both methods and as oats give very good yields following beets, it is very evident that it is more profitable to grow a crop of oats from the land and then seed alfalfa in the stubble in the fall than it is to seed alfalfa alone in the spring. When alfalfa is seeded alone in the spring on old land weeds become troublesome. They retard the growth of the alfalfa as much as a grain crop would if seeded as a nurse crop.

PASTURING ALFALFA WITH HOGS.

During the summer of 1917 four lots of 10 hogs each were used in an alfalfa pasture test in field A. Lots 1 and 2 each had access to 1 acre of alfalfa, while lots 3 and 4 each had access to half an acre.

Lot 1 differed from lot 2 in that the pasture for lot 1 was cut for hay every 30 days, while alternate halves of the pasture for lot 2 were cut every 15 days. Lot 3 differed from lot 4 in that the pasture for lot 3 was divided and the hogs were alternated from one to the other, while the pasture for lot 4 was not divided. Each lot was fed a total of 4,563 pounds of corn. This was about a 2 per cent corn ration during the first 2½ months and a 3 per cent corn ration during the last month.

The experiment began on May 15 and ended on August 31, a period of 107 days. The average initial weight of the hogs was about 105 pounds, and the average final weight varied from 241 pounds in lot 1 to 223 pounds in lot 4.

As the season was cold and backward and as the grasshoppers damaged the growth of these alfalfa pastures, the production was below normal. As a result little hay was harvested from pastures 1 and 2, while pastures 3 and 4 were at times overpastured, particularly pasture 4. The results are shown in Table VIII.

TABLE VIII.—*Results obtained by pasturing hogs on alfalfa on the Scottsbluff Experiment Farm in 1917.*

Item of comparison.	One-acre pastures.		Half-acre pastures.	
	Lot 1.	Lot 2.	Lot 3.	Lot 4.
Number of hogs pastured	10	10	10	10
Total initial weight.....pounds..	1,045	1,046	1,039	1,044
Final weight.....do....	2,413	2,381	2,318	2,230
Total gains made.....do....	1,368	1,335	1,279	1,186
Total corn fed.....do....	4,563	4,563	4,563	4,563
Corn fed per pound of gain.....do....	3.34	3.42	3.57	3.85
Hay harvested.....tons..	.69	1.02	None.	None.
Financial statement:				
Total cost of corn, at $1.07 per hundredweight	$48.82	$48.82	$48.82	$48.82
Total value of gain, at $7 per hundredweight	95.76	93.45	89.53	83.02
Net return per acre	46.94	44.63	81.42	68.40
Value of hay	5.52	8.16	.....	.....
Total net return	52.16	52.79	81.42	68.40

The results as given in Table VIII seem to show (1) that the difference in lots 1 and 2 are very slight, (2) that lots 1 and 2 consumed the greater part of the forage from the 1-acre pastures, (3) that lots 3 and 4 suffered a shortage of feed due to overpasturing, and (4) that a divided pasture will furnish more forage than a pasture of the same area not divided.

The financial statement in the above table is based on 60 cents per bushel for corn, $8 a ton for hay, $15 an acre for pasture, and $7 per

hundredweight for gain in weight of the hogs. This is the scale of prices used in reporting previous experiments. Actual prices were very much higher at the time the experiment was conducted. The average cost of the corn fed was $3.50 per hundredweight, and the hogs sold on the Denver market for $18.35 per hundredweight on September 3, at the close of the experiment. With these actual prices, the returns are higher than if the results are calculated on the basis of normal prices.

When the hogs are charged $3.50 per hundredweight for corn, $20 an acre for alfalfa pasture, and credited $17 per hundredweight for the gains made and if the small amount of very poor hay that was harvested at a high cost is not considered, the net profit per hog was $5.28 for those in lot 1, $4.72 for those in lot 2, $4.77 for those in lot 3, and $3.19 for those in lot 4.

ALFALFA PREFERENCE TEST.

It had been noticed that the hogs seemed to show a preference for certain areas in large alfalfa fields and it was suspected in each case that this area was the Turkestan variety. To determine whether hogs really did show any preference for Turkestan alfalfa over common alfalfa, seed of known source was obtained and seeded in alternate strips about 20 feet wide across field C–VI in 1916. Four strips of Turkestan and four of common alfalfa were seeded. In addition to this, about one-quarter acre of Turkestan and 1½ acres of common alfalfa were seeded in the same field at the same time.

In the spring of 1917 these narrow plats of alfalfa were fenced in one pasture with a dividing fence cutting each strip in the middle, leaving half of each plat in each pasture. About half as many hogs as this pasture could carry were used, and they were alternated from one part of the pasture to the other at about 10-day intervals. Each time the hogs were changed the plat from which the hogs were taken was clipped.

The hogs had been on this alfalfa only a few days when it was very noticeable that they grazed the Turkestan alfalfa a great deal more than they did the common variety. The hogs showed this preference through the entire season. The Turkestan variety was eaten close to the ground, while the common alfalfa was often 10 to 12 inches high.

The field which contained one-quarter acre of Turkestan and 1½ acres of common alfalfa was fenced into one pasture with the house and feeding place in the opposite end of the field from the Turkestan alfalfa. Ten sows and litters were turned into this pasture when the alfalfa was about 10 inches high. Before the hogs were turned in it was not possible to detect the dividing line between the two varieties.

The hogs had been in the pasture only two days when this dividing line was very distinctly shown. Within a very few days the Turkestan was eaten close to the ground, while to get to it the hogs were wading through common alfalfa over a foot high.

While there are not data enough at hand as yet to warrant a statement that one variety has a greater carrying capacity or a higher nutritive value than the other, it is clear that hogs show a very decided preference for Turkestan alfalfa over the common variety.

ALFALFA-ROTATION HOG PASTURE.

Since the beginning of the irrigated rotations in 1912 it has been the practice to use the third-year alfalfa plat in rotation 65 as a hog pasture. The grazing season is divided into two periods, fall-farrowed hogs being used in the first period and spring-farrowed hogs in the second. The quarter-acre plat is divided into two parts, which are grazed alternately. In addition to the alfalfa pasture the hogs were fed a 2 per cent ration of shelled corn.

The results of this experiment for 1917 are given in Table IX, with a 5-year average, all expressed on the basis of 1 acre.

TABLE IX.—*Results of pasturing alfalfa with hogs on the Scottsbluff Experiment Farm during the season of 1917.*

Items of comparison.	Season of 1917.			5-year average.
	Spring period.	Summer period.	Total.	
Number of hogs pastured	20	20	.....	.....
Total initial weight.....pounds..	2,284	1,352	.....	.....
Total gains made.....do....	1,244	1,400	2,644	3,167
Total corn fed.....do....	3,868	3,248	7,116	7,816
Corn fed per pound of gain.....do....	3.11	2.32	2.71	2.47
Financial statement:				
Net returns from pasture	$45.69	$63.25	$108.94	$138.08
Cost of 100 pounds of gain (pasture at $15, corn at $1.07 per hundredweight)	3.93	3.00	3.46	3.12

If the value of the gains made are figured at $7 per hundredweight and the corn fed at $1.07 per hundredweight, the net returns are $45.69 for the first period and $63.25 for the second period, with a total of $108.94 for the season. On the same basis the average net return for five years is $138.08 per acre. Alfalfa plats comparable to the plat pastured gave an average yield for the season of 4.81 tons per acre. On the basis of this yield the hogs paid the equivalent of $22.63 per ton for the 1917 hay crop. The average yield for five years of alfalfa plats similar to the plat pastured is 5.5 tons per acre. At this rate the hogs have returned annually a value of $25.10 per ton for the hay harvested in the field.

PASTURING SHEEP ON ALFALFA.

Lambs taken from the winter feed lot to be used for breeding stock were used in a test of alfalfa for pasture. They were sheared just before the pasturing test began. Eight lambs had an average initial weight of 91 pounds, and they were turned on the alfalfa on May 17 and taken away on October 3. During the 139 days that the lambs were on pasture they made an average gain of 22.6 pounds each, or a combined net gain of 181 pounds for the season. This is equivalent to a gain of 275 pounds per acre.

The alfalfa pasture with a total area of 0.65 acre was divided into two parts and the sheep alternated from one part to the other as required. The lambs received no additional feed. They were in a good thrifty growing condition during the entire summer and no trouble was caused by bloat. Notwithstanding the fact that grasshoppers became very troublesome on this pasture, it furnished an abundance of forage during the entire season. On the basis of this test, 1 acre of alfalfa would carry 12 yearling lambs through the summer in a good thriving condition.

SWEET CLOVER FOR PASTURE.

PASTURING WITH HEIFERS.

A sweet-clover pasture with a total area of 1.32 acres in field B–III was divided into three parts and four heifers were changed from one to the other as pasturing needs required. Two 2-year-old and two long-yearling heifers were used in this test. Three were turned into the pasture on May 17 and another was added on July 9. Even the four heifers did not keep the pasture down, and two milch cows were added for 10 days, beginning on July 18. One heifer calved on September 5 and was taken off. A statement of the results of this pasture test is given in Table X.

TABLE X.—*Results of pasturing sweet clover with heifers on the Scottsbluff Experiment Farm from May 17 to October 13, 1917.*

Items of comparison.	Heifers pastured.				
	No. 1.	No. 2.	No. 3.	No. 4.	Total.
Time on pasture.....days..	150	150	97	113	512
Initial weight.....pounds..	546	520	900	730	2,696
Final weight.....do....	680	690	990	840	3,200
Average daily gain.....do....	0.89	1.13	0.927	0.973	3.92
Gains made.....do....	134	170	90	110	504

During the early spring the sweet clover made slow growth, but during the summer months it furnished an abundance of feed. The heifers received no additional feed and were in a good thriving condition during the entire period. No bloat occurred. The net

gain in weight made by the heifers is equivalent to 382 pounds per acre of pasture, not including the feed consumed by the two cows for 10 days in midseason.

If sweet clover were a perennial crop its value for pasture would be greatly increased, but it is a biennial crop and does not furnish very much forage the first year.

PASTURING WITH SHEEP.

Lambs similar to those used in the alfalfa-pasturing test were used in a test of sweet clover for pasture. The pasture was located in field B–III. It included 0.42 acre and was not divided. The lambs were turned into the sweet clover on May 17 and were taken away on October 3. They were off from June 29 until July 23 because of overpasturing. During this time they were pastured on a ditch bank, making a gain of 26 pounds in the 24 days. The lambs were on the sweet-clover pasture 115 days during the season and made a net gain of 131 pounds from the plat. This is equivalent to 312 pounds of gain per acre and is to be compared with the gain of 278 pounds made by the lambs on alfalfa pasture.

SUGAR BEETS.

TIME-OF-THINNING TEST.

The land which was in grain in 1916 (field I–I south) was used in 1917 for growing sugar beets in a time-of-thinning test. In the spring, before it was plowed for beets, it received an application of barnyard manure at the rate of about 12 tons per acre. The beets were planted on May 8. There was a total of 18 plats. Six of these plats were thinned on June 27, the ordinary time for thinning; six were thinned on July 7, and six on July 17. Otherwise the plats received the same treatment. There was a perfect stand on all the plats. The average yield of the six plats that were thinned on June 27 was 17.16 tons per acre; the average yield of the six plats thinned on July 7 was 13.77 tons per acre; and the average yield of the six thinned on July 17 was 9.61 tons per acre. In other words, the yield was cut down 3.39 tons per acre by delaying thinning 10 days and 7.55 tons per acre by delaying thinning 20 days. If hauling costs $2 per ton and if no allowance is made for the increased value of the tops, the decrease due to late thinning amounted to $18.65 per acre where thinning was delayed 10 days and $43.53 per acre where thinning was delayed 20 days. Early planting and early thinning are recommended.

COMPARATIVE EFFECT OF MANURE AND ALFALFA ON SUGAR-BEET YIELDS.

In the irrigated rotations sugar beets are grown on quarter-acre plats in 14 different crop rotations. In four of these rotations sugar beets receive manure, in four rotations they receive the residual

effect of alfalfa, and in six rotations they receive neither manure nor the effect from alfalfa. In three of the manured rotations sugar beets follow the manure, while in one rotation they follow potatoes that have been manured. In two rotations sugar beets follow alfalfa the second season after the alfalfa is plowed up, and in two rotations they follow alfalfa the third season.

Table XI gives the average yield of these different sugar-beet plats for each year and shows the increase in tons per acre due to the effect of manure and alfalfa.

TABLE XI.—*Comparative effect of manure and alfalfa on the yield of sugar beets on the Scottsbluff Experiment Farm during the 4-year period from 1912 to 1915, inclusive, and in 1917.*[1]

Year.	Average yield per acre (tons).				
	Check (6 plats).	Manured (4 plats).	Alfalfa land (4 plats).	Increase in favor of—	
				Manure.	Alfalfa.
1912	17.79	21.09	.....	3.30	.....
1913	17.01	22.87	.....	5.87	.....
1914	14.39	18.26	20.92	3.87	6.53
1915	10.73	14.67	14.76	3.94	4.42
1917	11.09	17.16	15.76	6.07	4.67
Average	.....	.....	.....	4.61	5.21

[1] In 1916 the beet crop was badly damaged by hail, and the yields of that year are omitted from the table.

Table XI shows that the increase due to the effect of manure has varied from 6.07 tons in 1917 to 3.3 tons in 1912, with a 5-year average of 4.61 tons per acre. These plats were manured at the rate of 12 tons per acre. On this basis each ton of manure increased the beet yield 0.384 of a ton, or the equivalent of $2.11 when $2 a ton is allowed out of $7.50 for hauling the extra tonnage of beets.

The increase due to the residual effect of the alfalfa has varied from 6.53 tons in 1914 to 4.42 tons in 1915, with a 3-year average of 5.21 tons per acre. In other words, the residual effect of alfalfa even during the second and third seasons after the alfalfa was plowed up amounted during a 3-year period to a net increase of $28.65 per acre.

EFFECT ON SUCCEEDING CROPS OF PASTURING ALFALFA.

In 1914 and 1915 eight plats of alfalfa in field K–V were pastured by hogs receiving different quantities of grain, while two plats were harvested for hay. These 10 plats were seeded to alfalfa in 1912. Hay was harvested from all plats in 1912 and 1913. The plats were plowed up in 1916 and planted to potatoes and in 1917 were seeded to beets. The yields from the pastured plats were consistently higher both years than those of the unpastured plats, as shown in Table XII.

TABLE XII.—*Comparative yields of potatoes and sugar beets grown on alfalfa-hay land and on alfalfa-pasture land on the Scottsbluff Experiment Farm in 1916 and 1917.*

Kind of land.	Number of plats.	Average yield of crop.	
		Potatoes in 1916.	Beets in 1917.
		Bushels.	*Tons.*
Alfalfa-pasture land	8	316.0	18.29
Alfalfa-hay land	2	288.3	16.72
Increase from pastured land		27.3	1.57

VARIETY TEST OF MANGELS.

Land which was in small grain in 1916 was used for growing varieties of mangels in 1917. This land before being plowed in the spring was manured at the rate of 12 tons per acre. Five varieties were grown on duplicate plats. The average yield from these duplicate plats, together with the yields from the same varieties in previous years, are shown in Table XIII.

TABLE XIII.—*Yields of different varieties of mangels on the Scottsbluff Experiment Farm in 1913, 1914, 1915, and 1917.*

Year.	Yield per acre (tons).				
	Mammoth Long.	Golden Tankard.	Giant Eckendorf.	Danish Sludstrup.	Giant Half-Sugar.
1913	36.50	38.10	.....	.....	32.00
1914	17.80	14.40	.....	19.60	17.50
1915	18.20	14.50	.....	18.40	22.00
1917	24.50	20.87	28.46	20.45	25.01
Average	24.25	21.97	28.46	19.48	24.13

The yield of the five varieties of mangels in 1917 varied from 20.45 tons to 28.46 tons per acre. Sugar beets on similar land receiving the same care yielded an average of 17.16 tons per acre. It had been planned to use these mangels in a feeding test with hogs to determine their relative feeding value,[1] but they were damaged by an early severe freeze, followed by very warm weather, from the effects of which they rotted. It has been the experience at the station that mangels are much more difficult to silo successfully than sugar beets.

POTATOES.

VARIETY TEST.

Potato varieties were tested on alfalfa land in field A that had been used as a hog pasture during the summer of 1916. The potatoes were planted in duplicate plats on June 1, the seed of each

[1] For the comparative feeding value of sugar beets and mangels, see Holden, J. A., Pork production on irrigated lands in western Nebraska, Nebr. Agr. Exp. Sta. Bul. 159, 31 p., 3 fig., 1917.

variety being first treated with corrosive sublimate. The average yields in bushels per acre from these duplicate plats are given in Table XIV.

TABLE XIV.— *Yields of potatoes in a variety test on the Scottsbluff Experiment Farm in 1917.*

Variety.	Yield per acre (bushels).		
	Culls.	Market-able.	Total.
Rural	41.6	443.3	484.9
Red Triumph	39.0	417.0	456.0
Downing	30.4	424.7	455.1
Eureka	31.4	376.1	407.5
Early Ohio	45.8	350.6	396.4
Pearl	35.3	297.5	332.8

In spite of the fact that the seed tubers were treated with corrosive sublimate, the crop was injured by scab. There was less scab on the Rural and Red Triumph varieties than on any of the others. Tubers of the Early Ohio and Pearl varieties were rather rough and knotty. The Rural, Downing, Eureka, and Pearl are white potatoes, while the Red Triumph and Early Ohio are red potatoes.

The Rural is a high-yielding potato, but it requires a rather long growing season, considerably longer than any of the other varieties. The Red Triumph is also a very good yielding and a medium early maturing variety. While it does not mature as early as the Early Ohio, it is earlier than the Eureka or the Pearl. During the past two years there has been an increasing demand for the Red Triumph, which is shipped to Texas for seed stock. As Texas uses northern-grown seed almost exclusively, there is a possibility of developing this feature of the potato industry in the North Platte Valley.

During the fall of 1917 the Red Triumph sold locally at a premium of at least 50 per cent over all other potatoes, and even at that price the demand was greater than the supply. The Downing, Eureka, and Pearl varieties resemble each other closely; especially is this true of the Downing and the Pearl. The Downing, however, matures a little earlier than either the Eureka or the Pearl. For some reason the yields of the Pearl variety were relatively low, while the yields of the Early Ohio were high.

TIME-OF-PLANTING TEST.

A time-of-planting experiment with potatoes was conducted in the same field as the variety test. In this time-of-planting test, in which plantings were made at four weekly intervals beginning on June 11, the yields decreased consistently with the advance of the planting date, as shown in Table XV.

TABLE XV.—*Yields of potatoes in a time-of-planting test on the Scottsbluff Experiment Farm in 1917.*

Variety and time of planting.	Yield per acre (bushels).		
	Culls.	Marketable.	Total.
Eureka:			
June 11	24.4	248.2	272.6
June 18	13.6	219.0	232.6
June 25	21.7	132.9	154.6
July 2	19.8	106.2	126.0
Pearl:			
June 11	32.0	310.2	342.2
June 18	29.5	308.3	337.8
June 25	45.7	221.2	266.9
July 2	14.1	189.8	203.9
Rural, July 2	18.7	195.0	213.7

The principal object of this time-of-planting test was to get data on the yield of potatoes from late plantings for use in determining the advisability of planting potatoes on land where the sugar beets have been blown out by spring winds. There is a rather large acreage of such land on the project each spring. As shown in Table XV, the Pearl and Rural varieties both gave yields of more than 200 bushels per acre from plantings made on July 2. It is generally admitted that immature tubers are as good as, if not better than, matured tubers for seed stock. This being true and owing to the fairly good yields that are possible from late planting, potatoes are suggested as a possibility at least for recropping blown-out beet land.

EFFECT OF ALFALFA AND MANURE.

There are in the irrigation rotation experiments 13 plats of potatoes, each grown under a different crop rotation. Potatoes follow alfalfa in four rotations; in three rotations potatoes come on plats that have been manured, while in the other six rotations where potatoes are grown there is no alfalfa or manured plat. The 1917 yield, together with a 6-year average yield, is shown in Table XVI.

TABLE XVI.—*Effect of alfalfa and of manure on the yield of potatoes grown on the Scottsbluff Experiment Farm in 1917.*

Kind of plats.	Number of plats averaged.	Yield per acre (bushels).				
		1917			Increase.	
		Maximum.	Minimum.	Average.	1917	6-year average.
Alfalfa land	4	346.5	273.4	298.0	159.4	104.0
Manured land	3	211.5	181.9	193.6	55.0	48.1
No alfalfa or manure	6	166.6	122.1	138.6	.....	.....

The residual effect of alfalfa increased the yield of potatoes in 1917 by 159.4 bushels per acre, while the 6-year average shows an increase of 104 bushels. The manured plats show a 6-year average increase of 48.1 bushels per acre. Potatoes follow alfalfa with very good results, but sugar beets respond more definitely to the effect of manure.

CORN.

FIELD-CORN VARIETIES.

The corn used in the variety test was all of local varieties which have been grown in the North Platte Valley for a number of years. The names applied to some of these varieties are those of the farmers from whom the seed was obtained and who have grown and selected these particular strains for some years past. This corn was planted on May 24 on duplicate tenth-acre plats of each variety, on alfalfa land in field H. The yields are recorded in Table XVII.

TABLE XVII.—*Yields of corn in a variety test on the Scottsbluff Experiment Farm in 1917.*

Variety or strain.	Ear corn per plat (pounds).		Average per acre (bushels).
	Plat 1.	Plat 2.	
Dry-Land White	501	530	71.5
Sands White	435	448	61.1
Youngheim	435	441	60.4
Calico	394	400	55.1
Sands Yellow	378	398	53.8

The Dry-Land White corn has been grown in the dry-land rotation experiments on the experiment farm during the past six years. At the beginning it was obtained from a local farmer. The Sands White and Sands Yellow were obtained from a Mr. Sands, of Gering Valley, who has grown the white variety for many years and the yellow variety for a shorter period. The Youngheim corn has been grown by a Mr. Youngheim on his farm north of Mitchell for a number of years. The Calico variety has been grown on the experiment farm for six years and in previous years has made the highest yield in the variety tests.

Table XVII shows that the Dry-Land White made the highest yields, with an average of 71.5 bushels per acre. There was practically no difference in the yield of the Sands White and Youngheim. For some reason, the yield of the Calico variety was below normal. The Sands Yellow was the lowest yielding variety, with a yield of 53.8 bushels per acre. There was but little difference in the time of maturing of the first four varieties, while the Sands Yellow matured 10 days or two weeks earlier than the other varieties. The Sands Yellow grows a very small stalk, but it produces well and is especially recommended for late planting.

COMPARISON OF EASTERN-GROWN AND LOCALLY GROWN SEED.

The two strains of Calico corn used in this test were originally from the same stock. One strain has been grown in the eastern part of the State where the growing season is long, while the other strain has been grown in the North Platte Valley, where the growing season is short. The corn from the eastern-grown seed made a very much ranker growth than that from locally grown seed. The former was at least 2 feet taller than the latter. When frost came, however, the local corn was well matured, while the eastern corn had barely passed the roasting-ear stage. The local corn made a yield of 63.8 bushels of good corn per acre, while the eastern produced 37.4 bushels of corn having very little feeding value.

EFFECT OF ROTATION ON CORN.

Six plats of corn are grown in the irrigated rotation experiments. In two rotations corn follows alfalfa, while four plats are grown in rotations that do not include alfalfa nor do they receive manure. One of the corn plats following alfalfa is hogged, while all the others are harvested. A 6-year average yield from these corn plats is 51.8 bushels per acre. The average yield for 1917 was 48.5 bushels. Corn following alfalfa showed an increase of 14.6 bushels per acre over the average yield from the other corn plats. Corn following oats shows a slight advantage over corn following a cultivated crop. To plant corn following sugar beets can not be recommended.

HOGGING CORN.

One corn plat in the irrigated rotations was harvested by hogs. Three spring-farrowed shotes, weighing a total of 283 pounds, were turned into the quarter-acre plat on September 20. When removed 40 days later they weighed 466 pounds, a gain of 183 pounds, or 732 pounds per acre.

The estimated yield of the corn plat was 820 pounds. If this estimate is correct, it required 4.48 pounds of corn to produce 1 pound of pork. If the gains are valued at 7 cents a pound, the hogs paid $1.56 per hundredweight for the corn in the field.

SILAGE.

The varieties of field corn which were included in the variety test already reported, together with two long-season varieties of corn and one variety of sunflowers, were included in a test for silage. These silage crops were planted on May 24 in tenth-acre plats in field H on land that had been in alfalfa. The test comprised one plat of each of the five field-corn varieties and three plats of each of the other crops. The field-corn varieties and the sunflowers were cut

and put into the silo during the first week in September, while the two silage-corn varieties were not cut until the last of September. The field-corn varieties were fairly well dented at the time they were cut, while the silage varieties had only reached the roasting-ear stage. The sunflowers were well into the dough stage when cut. All of the corn varieties were cut with a corn binder, but the sunflowers were cut by hand. The yields are given in Table XVIII.

TABLE XVIII.—*Yields of corn and sunflowers used for silage in a variety test on the Scottsbluff Experiment Farm in 1917.*

Crop.	Per plat.	Per acre.	Crop.	Per plat.	Per acre.
	Pounds.	*Tons.*		*Pounds.*	*Tons.*
Sands Yellow corn (1 plat)	1,560	7.80	Nebraska White (average of 3 plats)	3,380	16.90
Dry-Land White (1 plat)	2,094	10.47			
Calico (1 plat)	2,360	11.80	Russian sunflowers (average of 3 plats)	4,586	22.93
Youngheim (1 plat)	2,450	12.25			
Sands White (1 plat)	2,460	12.30			
Hagner's Yellow (average of 3 plats)	3,180	15.90			

In filling the silo the corn and sunflowers were placed in layers of about 4 feet. This was done to see whether the cows would show any preference for either and whether a change from one to the other would cause any fluctuation in the milk flow. The cows did show a preference in favor of the corn silage. While they ate the sunflower silage very well, they would not eat so much as of the corn silage. There was no noticeable fluctuation in the milk flow.

A view of one of the plats of sunflowers is shown on the title-page.

VARIETY TEST OF BEANS.

Five varieties of beans were planted on duplicate plats on June 6 in field A–III. Grasshoppers caused some damage to this crop. The varieties and the average yields from the duplicate plats are given in Table XIX.

TABLE XIX.—*Results obtained in a test of bean varieties on the Scottsbluff Experiment Farm in 1917.*

Variety.	Yield per acre.	Date of harvesting.
	Bushels.	
Red Mexican	17.4	Sept. 10
Tepary	16.2	Do.
Large navy	15.5	Do.
Small navy	14.0	Do.
Pinto	13.0	Sept. 28

The yields from the duplicate plats in the bean-variety test varied considerably. The pinto was the most disappointing. This being a late variety, it may be that the injury by grasshoppers came at a critical

period, while the other varieties may have passed this stage before the grasshoppers became so troublesome. As a rule, the pinto yields well on the project, but requires a rather long growing season, and the colored beans usually sell for less than the white beans. The Red Mexican appears to be a very good yielding and an early-maturing variety. While the tepary, which is a very small white bean, promises to yield well and is medium early, it is not to be recommended, because it shatters badly. Of the two navy beans, the large navy seems to give a higher yield and does not shatter so much. It must be remembered that the yields here given are the results of only one season.

SMALL GRAIN.

BARLEY VARIETIES.

Six varieties of barley grown on manured stubble land in field C, which was plowed in the spring, were used in this experiment. They were seeded in duplicate tenth-acre plats on April 23. The varieties used, the yields made, and the time harvested are shown in Table XX.

TABLE XX.—*Results obtained in a test of barley varieties on the Scottsbluff Experiment Farm in 1917.*

Variety.	Yield per acre.[1]	Date of cutting.
	Bushels.	
Trebi	79.4	July 28
Barbary	63.2	Do.
Franconia	56.2	July 30
Svanhals	60.4	July 28
Hooded	37.3	Aug. 6
Bald	37.2	Do.

[1] The hooded and bald barleys are figured on the basis of 60 pounds per bushel, the others at 48 pounds per bushel.

OAT VARIETIES.

This test was made on spring-plowed stubble land in field C–V that had been manured. The oats were seeded on tenth-acre plats on April 23. The results of this test are recorded in Table XXI.

TABLE XXI.—*Results obtained in a test of oat varieties on the Scottsbluff Experiment Farm in 1917.*

Variety.	Yield per acre.	Date of cutting.
	Bushels.	
Newmarket	76.4	Aug. 9
Swedish Select	70.0	Aug. 6
Canadian	69.9	Aug. 4
Big Four	68.3	Aug. 9
Kherson	64.4	July 30

The Kherson oat, although it does not yield so much as other varieties, matures earlier than either of the others. Early-maturing varieties have two advantages: (1) When used as a nurse crop or when alfalfa seeding is to follow in the fall, the early variety is taken off the land earlier, thus giving the alfalfa a better chance to make a growth; and (2) an early variety is out of danger of hail sooner.

WHEAT VARIETIES.

Wheat was seeded on spring-plowed stubble land in field C–IV that had been manured. The seeding was made on April 12 on duplicate tenth-acre plats. The results are given in Table XXII.

TABLE XXII.—*Results obtained in a test of wheat varieties on the Scottsbluff Experiment Farm in 1917.*

Durum varieties.	Yield per acre.	Common varieties.	Yield per acre.
	Bushels.		*Bushels.*
Arnautka	52.4	Defiance	50.2
Beloturka	52.9	Galgalos	49.4

Wheat was cut on August 9. The durum wheats—Arnautka and Beloturka—lodged badly, while the Defiance and Galgalos varieties stood up in good condition. The Defiance is a soft wheat, but it usually yields well, and it has a stiff straw.

EFFECT OF ROTATIONS.

The oats in the irrigated rotations were damaged badly by grasshoppers. This was particularly true of the plat that followed alfalfa. The average yield from the 18 plats was 71.6 bushels per acre. The residual effect of manure that had been applied to the previous crop showed an increase of 17.5 bushels per acre. The plats following alfalfa, although injured by grasshoppers, showed an increase in yield of 19.5 bushels per acre. Oats following a grain crop gave smaller yields than oats following potatoes or beets. Oats on disked corn land still show an increase over oats following potatoes or beets.

Wheat following alfalfa made a yield of 40.2 bushels per acre, and where it followed oats the yield was 23.7 bushels. Winter wheat grown on the same plat for six years yielded 28.3 bushels.

Approved:

WM. A. TAYLOR,
Chief of Bureau.

SEPTEMBER 10, 1918.